

## CHAPTER 6: PROMOTING ENVIRONMENTAL SUSTAINABILITY



Norfolk possesses a diversity of environmental resources that improve the quality of life for its residents. Natural resources extend along its Chesapeake Bay beaches and dunes and in its rivers and wetlands. City parks, recreational fields, open green spaces, and even street trees are the fabric that connects the natural spaces.

Norfolk has an estimated 144 miles of shoreline and approximately 750 acres of wetlands. The City is virtually surrounded by water; the Bay, rivers, and tidal creeks that comprise this water provide aquatic ecosystems and have historical significance. They also provide recreational boating, fishing, and bird watching opportunities, sustain marine commerce, and serve as aesthetic amenities, adding beauty, value, and quality of life to Norfolk's neighborhoods.

Development pressures and maritime and commercial interests, combined with a large military presence, have led to the loss of a significant percentage of Norfolk's historic tidal wetlands. Today, however, tidal wetlands are recognized as a valuable resource,

for their inherent value in flood control, water quality enhancement, and wildlife habitat, and as an aesthetic resource that improves the quality of life for all citizens.

Norfolk has taken a leadership role in promoting and implementing new shoreline stabilization techniques using native vegetation and has completed 33 wetland restoration projects with various community partners such as the Lafayette River Partnership and the Elizabeth River Project (see Map ES-3).



There are approximately seven miles of dune and beach habitat fronting the Chesapeake Bay within the City. These areas are under constant attack from normal wave activity, in addition to storm events. Man-made disturbances to the dune system also threaten beach stability. Invasive plant species have been found on the beaches, threatening the habitat value provided by native species.



A tree canopy currently covers approximately 26% of Norfolk's land area (2017 estimate), which represents a decline between 2013 and 2017. This tree canopy offers many benefits, including the conservation of energy – through the reduction of temperatures by providing shade – and the reduction of air pollution. It also provides wildlife habitat, social and educational opportunities, and aesthetic benefits. Threats to Norfolk's tree canopy include disease, harmful insects, aging trees, and the unnecessary removal of trees. In order to offset these threats and to reverse the tree canopy decline, the City strives to diversify tree species, replace aging trees, incentivize the planting of new trees and conservation of existing trees, and enforce regulations that protect trees.



Given Norfolk's location on the coast, the natural environment also presents challenges in the form of floods, hurricanes, and other natural hazards. Map ES-1 illustrates the areas of the City that the Federal Emergency Management Agency (FEMA) has determined are in flood zones, while Map ES-2 shows the potential storm surge impact of hurricanes by storm category. The City participates in the National Flood Insurance Program which offers flood insurance to homeowners, renters, and business owners. Norfolk has also adopted regulations to help reduce the impact of flooding. However, potential sea level rise and other gradual and catastrophic natural events call for additional measures.

Pursuing environmental sustainability, meeting the needs of the present without compromising the ability of future generations to meet their needs, is the key to preserving the natural environment and preparing for potential risks posed by natural events. In addition to actions that protect and enhance the environment, actions are needed to conserve resources and reduce the overall impact of the built environment on the natural environment. Norfolk is taking steps in this direction by utilizing “Green” building practices in several recent city projects, including Lamberts Point Recreation Center and Crossroads Elementary School, and pursuing energy-saving initiatives in City facilities. In addition, Norfolk is promoting sustainability in the private sector through Green Vision Norfolk, a city initiative to promote programs and educate residents about the importance of energy conservation.



### KEY ISSUES

Based on existing conditions and trends, the following are the key issues involving environmental sustainability in Norfolk:

1. Protecting and improving the City’s waters, including the Chesapeake Bay.
2. Protecting Norfolk’s other natural resources.
3. Preparing for the consequences of natural hazards.
4. Incorporating sustainability into daily living.
5. Increasing tree canopy to reduce heat island and climate change impacts and provide another green infrastructure approach.

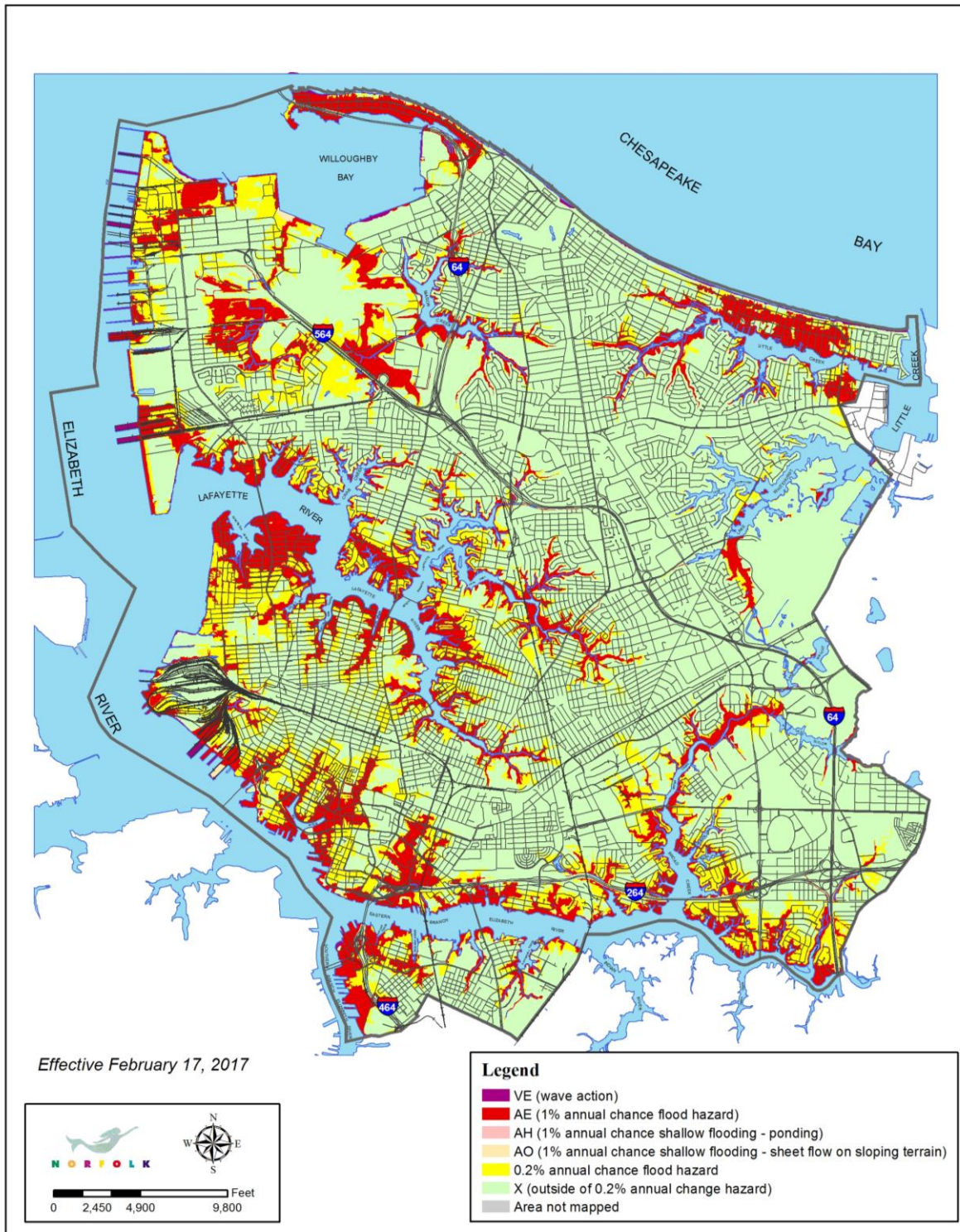
### IMPORTANT LINKAGES

The goals, outcomes, and actions outlined in this chapter are linked to goals, outcomes, and actions found in the following chapters:

- Identifying Land Use Strategies
- Creating and Maintaining Healthy and Vibrant Neighborhoods
- Providing Transportation Options
- Delivering Quality Community Services
- Enjoying Daily Life
- Fostering Responsible Regional Cooperation

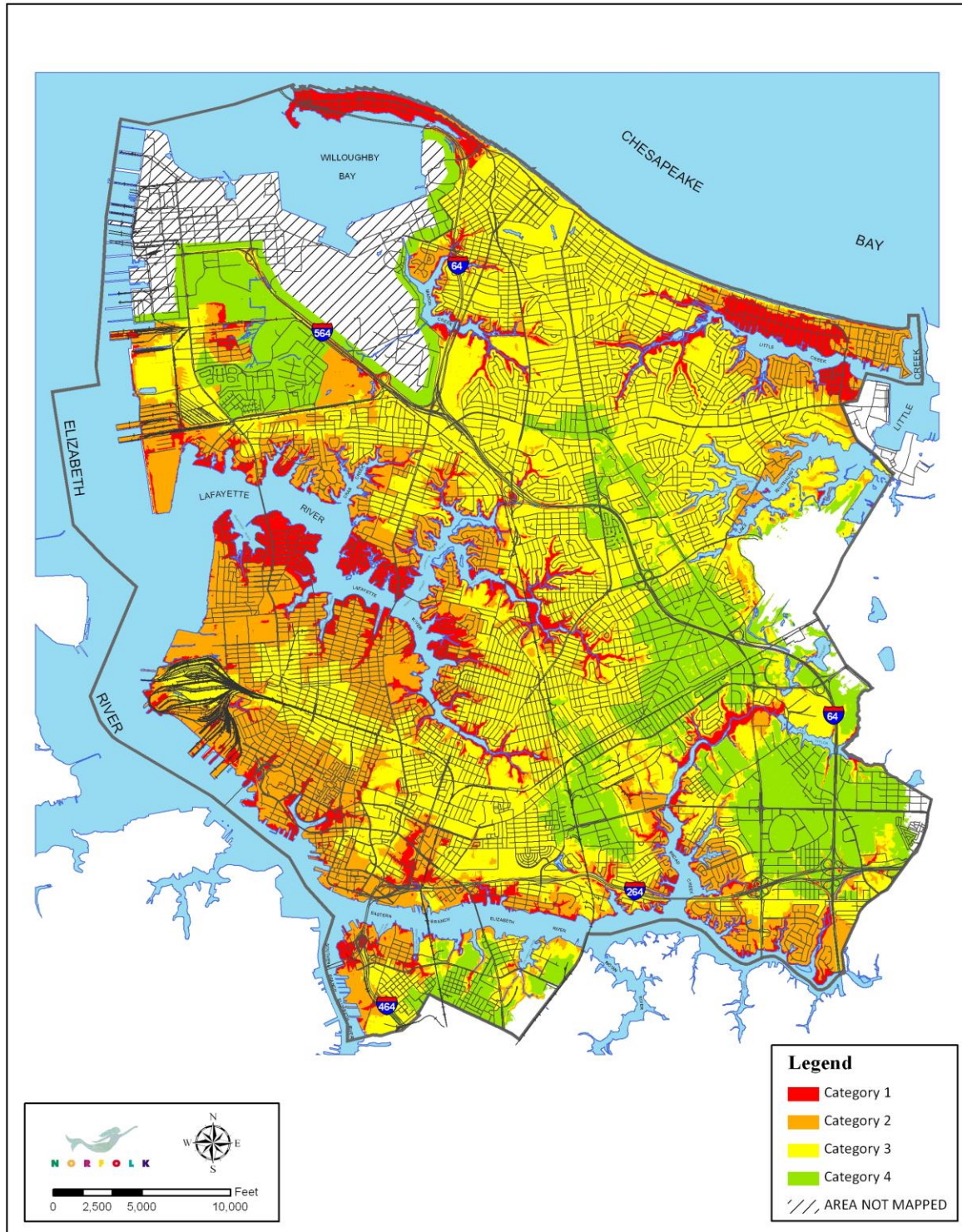


MAP ES-1. FEMA FLOOD INSURANCE RATE MAP





## MAP ES-2. STORM SURGE



**Environmental Sustainability Goal 1. Ensure high quality natural resources.**

**Outcome ES1.1. Enhanced water quality in the City's waterways and reservoirs, including the Chesapeake Bay and its tributaries.**

Metrics:

- *Change in the number of days Norfolk beaches are posted for health warnings or closed.*
- *Change in the extent of open oyster harvest conditions for all practical reaches of the City's rivers.*
- *Change in the land area of wetland and shoreline restoration projects.*

Action ES1.1.1. Reaffirm the *City of Norfolk Chesapeake Bay Preservation Area Program Supplement* (see Appendix B), adopted by Norfolk City Council on March 11, 2003.

*Comments: The City amended the 1992 General Plan to assist in meeting all mandated requirements set forth in the Chesapeake Bay Preservation Act, enacted by the Virginia General Assembly in 1988.*

Action ES1.1.2. Revise metrics for water quality based on meeting Total Maximum Daily Load (TMDL) standards, once established.

Action ES1.1.3. Continue to work with research institutions, such as Old Dominion University and the Virginia Institute of Marine Science, and environmental organizations, such as the Elizabeth River Project and the Chesapeake Bay Foundation, to improve water quality in Norfolk waterways.



Action ES1.1.4. Support implementation of the *Lafayette River Watershed Master Plan*.

*Comments: The master plan calls for making the Lafayette River swimmable by 2014 and restoring open oyster harvest conditions by 2020 (the Virginia Department of Health currently prohibits shellfish harvesting from the Lafayette River).*

Action ES1.1.5. Develop and implement a stormwater master plan.

Action ES1.1.6. Encourage the use of Best Management Practices (BMPs) reflective of Norfolk's urban character in order to reduce and filter stormwater runoff.



Action ES1.1.7. Consider revisions to development regulations to require enhanced on-site storage and filtration of stormwater for larger developments.

Action ES1.1.8. Incorporate bio-retention facilities, such as rain gardens, in municipal landscaping for passive treatment of stormwater using native plant species.



*Comments: The City has installed rain gardens at the Lamberts Point Recreation Center and the Ernie Morgan Environmental Action Center and supported the creation of the Knitting Mill Creek Community Gardens on unimproved City right-of-way.*



Action ES1.1.9. Encourage State action to update the *Virginia Erosion and Sediment Control Handbook* to recognize advances in erosion and sediment control techniques.

*Comments: The Virginia Department of Conservation and Recreation published the Virginia Erosion and Sediment Control Handbook in 1992 to provide guidance for all State erosion and sediment control programs. It covers basic concepts, measure design, installation, maintenance, plan review procedures, and administrative guidelines to support compliance with the Virginia Erosion and Sediment Control Law and Regulations.*



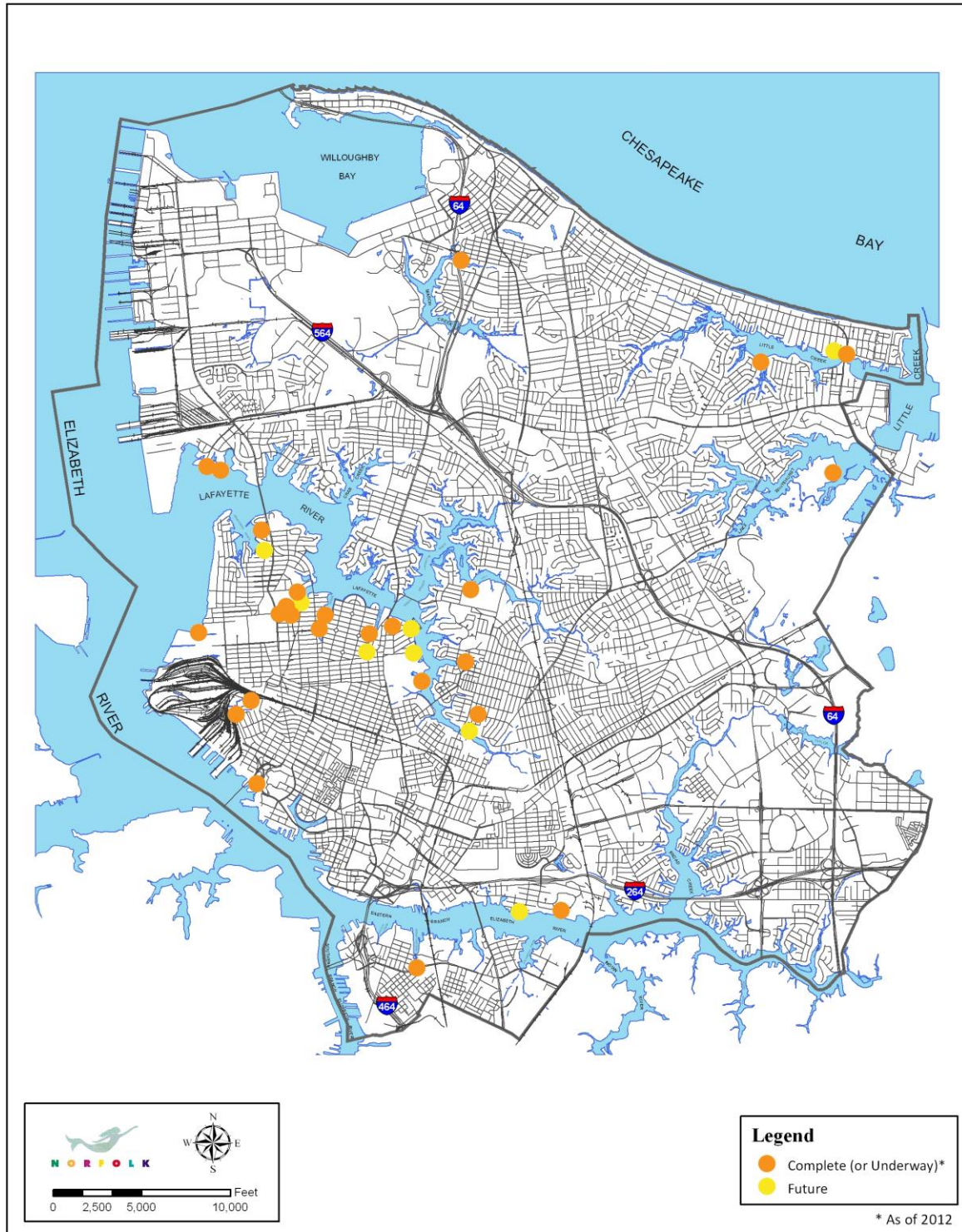
Action ES1.1.10. Increase the extent of natural areas along the waterfront, using shoreline restoration projects such as living shorelines, and consider incentives that could encourage their use.

*Comments: Shoreline restoration projects on public property can serve as a model, providing training, guidance, and assistance to private property owners, for the restoration of shorelines on private property (see Map ES-3).*

Action ES1.1.11. Develop criteria for defining environmentally sensitive areas that can be mapped to assist in selecting locations for shoreline restoration projects.



**MAP ES-3. CITY WETLAND RESTORATION PROJECTS**



Action ES1.1.12. Work with community partners to explore potential designation of Norfolk's waterways as "No Discharge Zones."

*Comments: No Discharge Zones are water bodies into which the discharge of sewage from all vessels is completely prohibited. This designation, assigned by the Environmental Protection Agency (EPA), must be applied for by the State following determination that the body of water requires greater protection than current federal standards allow.*

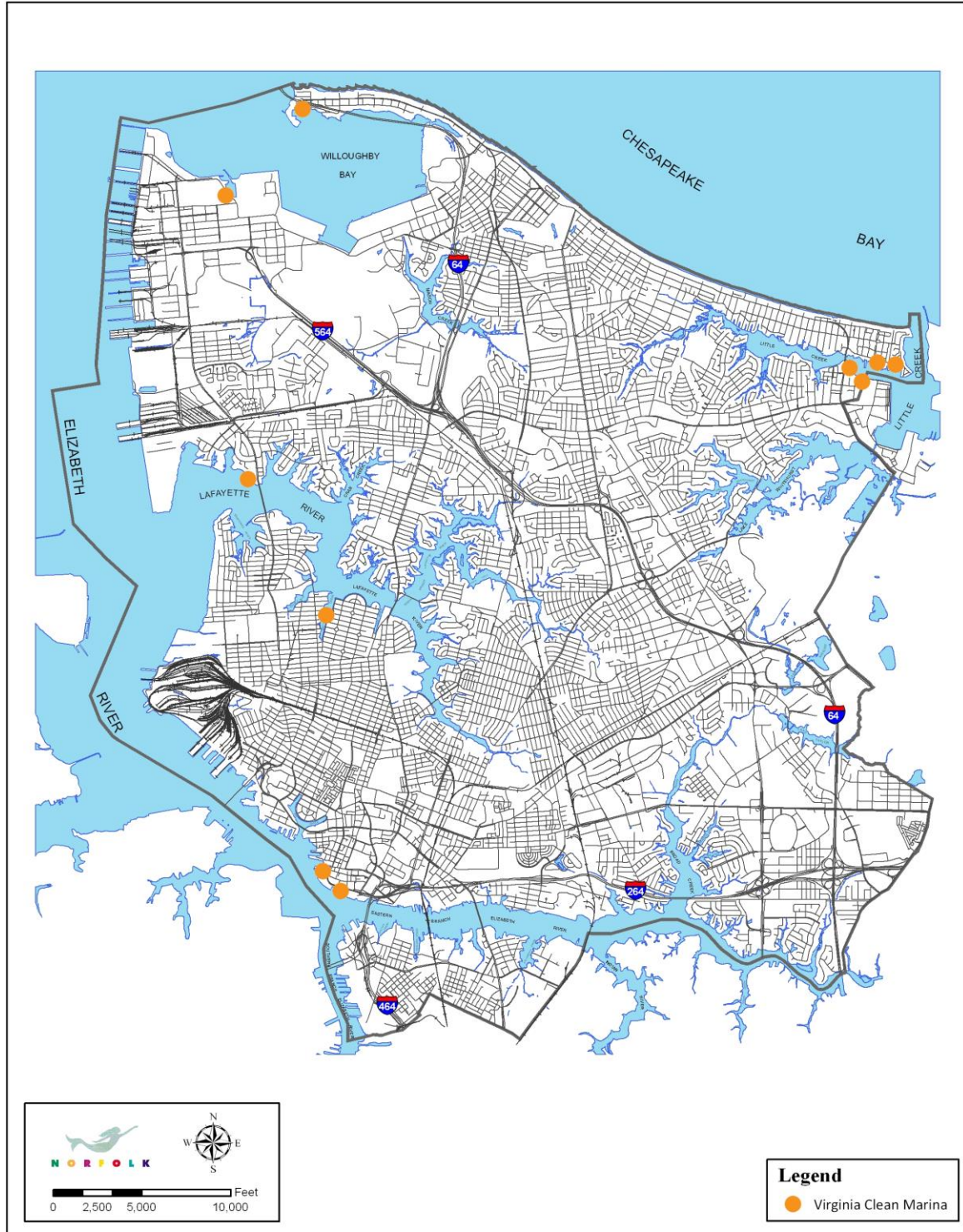


Action ES1.1.13. Encourage all marinas in Norfolk to seek designation as "Virginia Clean Marinas."

*Comments: The intent of Virginia Clean Marina Program is to provide technical assistance and educate marina operators and boaters on ways to maintain water quality and protect living resources by addressing issues such as unchecked stormwater runoff, drips from fuel docks, discharges from marine heads, and fish waste. Marinas that adequately address these issues are identified as "Virginia Clean Marinas". Ten marinas in Norfolk have received this designation as of 2011 (see Map ES-4).*



## MAP ES-4. VIRGINIA CLEAN MARINAS





Action ES1.1.14. Continue support of Hampton Roads Sanitation District (HRSD) and City of Norfolk improvements to the wastewater and stormwater systems (see the Delivering Quality Community Services chapter).

Action ES1.1.15. Install and maintain animal waste clean-up stations at community centers, beaches, schoolyards, and other community gathering places.

Action ES1.1.16. Continue public outreach and education regarding the responsible use of fertilizer, proper disposal of animal waste, and other potential water quality improvement actions.

Action ES1.1.17. Pursue amendments to the Zoning Ordinance that enhance tree protection, conservation, planting, and replacement requirements to help meet stormwater requirements and pollution reduction targets.

Action ES1.1.18. Implement *A Green Infrastructure Plan for Norfolk: Building Resilient Communities* (Green Infrastructure Plan) by exploring an expansion of the Stormwater Utility Fee Mitigation to include trees as an approved BMP.

*Comments: The City of Norfolk charges a fee for the stormwater generated by each property in the city to cover the cost of implementing stormwater improvements under the city's Municipal Separate Stormwater Permit. A clear procedure for reducing stormwater utility fees through BMPs should be in place in order to reward those who are treating their stormwater effectively on-site and trees should be added as an approved BMP.*

## Outcome ES1.2. Clean, healthy air that supports plant, animal, aquatic, and human life.

### Metrics:

- *Change in the number of days in which air quality measures exceed minimum standards.*

Action ES1.2.1. Support the development of a regional greenhouse gas emissions inventory and emission reduction targets.

Action ES1.2.2. Support regional efforts to increase travel by alternative modes, including the development of "Complete Streets" (see the Providing Transportation Options chapter).



Action ES1.2.3. Encourage the use of alternative commuting patterns such as remote workplace opportunities.

Action ES1.2.4. Implement policies that discourage vehicle idling periods greater than five minutes in any hour, and encourage similar improvements in the private sector.

Action ES1.2.5. Acquire City equipment and vehicles that utilize alternative fuels or exhibit high fuel efficiency, when feasible, in order to reduce carbon emissions.

Action ES1.2.6. Implement the Green Infrastructure Plan by expanding the Complete Streets Policy to create complete “green” streets, including constructed green infrastructure (e.g. bioswales) and trees.

### **Outcome ES1.3. An ecosystem that supports a diversity of plant and animal life.**

Metrics:

- Percent change in tree canopy coverage.
- Change in areal extent of dunes planted.

Action ES1.3.1. Increase the quantity, density, and diversity of trees to achieve a goal of 30% tree canopy cover through a combination of regulatory actions and City-provided trees.

*Comments: The City has augmented its street tree planting program with the Celebrate Trees Project as a way to increase tree cover, including establishing Living Legacy Groves in designated public parks or open spaces and encouraging residents and businesses to plant trees on private property in celebration of meaningful events. Living Legacy Groves have been established at Lakewood Park, Lafayette Park and Poplar Hall Park, with plans to expand the program to other areas in the City.*

Action ES1.3.2. Revise landscaping regulations to require the placement of shade trees in parking lots.

*Comments: This can serve to reduce the effect of reflected energy on temperatures (the urban heat island effect), as well as increase the tree canopy cover and reduce the amount of paved surface.*



Action ES1.3.3. Ensure every bus stop in the city has adequate shade trees, especially in areas where tree canopy is less than 30 percent.

Action ES1.3.4. Encourage the use of native species, for sustainability and drought resistance purposes, wherever possible.

Action ES1.3.5. Encourage developers to preserve, to the greatest extent possible, existing, non-invasive trees, especially larger ones.

Action ES1.3.6. Identify and control invasive species that threaten natural ecosystems.

*Comments: Phragmites is an invasive wetland plant common in Norfolk and beach vitex have been discovered on Norfolk dunes.*

Action ES1.3.7. Encourage connections of open green spaces throughout the City through the development of pedestrian and bicycle corridors.

Action ES1.3.8. Implement the Sand Management Plan (SMP) Guidance Document (Appendix B) to promote sand dune and beach stability, functionality, and resiliency while promoting the economic vitality and ecological resiliency of the Ocean View urban beach community and recognizing that the bayfront has a variety of distinct physical and geographic characteristics, each with unique preservation and maintenance issues.

Action ES1.3.9. Ensure that former waste disposal sites are safe while continuing to explore suitable reuse options.

Action ES1.3.10. Promote soil management best practices that enhance stormwater infiltration capacity.

Action ES1.3.11. Support the recruitment and expansion of “Green” businesses and manufacturers (see the Enhancing Economic Vitality chapter).



*Comments: State and federal initiatives aimed at creating offshore wind-energy sites off the coast of Virginia present supply chain opportunities for Norfolk and other municipalities.*

Action ES1.3.12. Target current city tree planting efforts to city neighborhoods where canopy is less than 30 percent (tree adoptions and right-of-way plantings).

Action ES1.3.13. Pursue amendments to the Zoning Ordinance and explore additional resources to enhance tree protection, conservation, planting, and replacement requirements in areas that prior to the passage of the federal Fair Housing Act of 1968, 42 U.S.C. § 3601 et seq., were redlined or graded "D" by the federal Home Owners' Loan Corporation.

*Comments: Redlining was a method of informally segregating neighborhoods in the 1930s and 1940s by assigning grades to residential neighborhoods that reflected their "mortgage security." These grades were based on the neighborhood's quality of housing, the recent history of sale and rent values, and, notoriously, the racial and ethnic identity and class of residents. Studies have shown higher land surface temperatures in formerly redlined areas as these policies diverted investment away from minority neighborhoods that created large disparities in the urban heat environment, with climate change only making this disparity worse.*

Action ES1.3.14. Implement the Green Infrastructure Plan by restoring trees and vegetation to upland areas where there is adequate space to plant trees. Use the potential planting areas (PPA) map of highest opportunity planting zones within the Green Infrastructure Plan.

Action ES1.3.15. Implement the Green Infrastructure Plan by planting street trees on key connection routes between civic spaces such as parks, schools and cultural sites for streets having low canopy (See map of street-by-street analysis, walk zones for parks and schools and the base green infrastructure network map within the Green Infrastructure Plan.

Action ES1.3.16. Develop an Urban Forest Management Plan (UFMP) for the city.

*Comments: An UFMP details a vision for urban tree canopy care. It meshes local government and community interests, outlining a way to proactively manage the urban canopy and provide long term benefits to the community.*

Action ES1.3.17. Pursue amendments to the Zoning Ordinance to require minimum tree canopy coverage in all zoning districts within the city for replacement or addition of trees on-site to help achieve the tree canopy goals contained in the Green Infrastructure Plan.

Action ES1.3.18. Pursue amendments to the Zoning Ordinance that include enhanced requirements for tree protection, conservation, planting, and replacement on public and private properties.

## Environmental Sustainability Goal 2. Prepare for the consequences of natural hazards.

### Outcome ES2.1. Reduced risk and increased resilience to gradual and catastrophic natural events.

Metrics:

- Percent of properties in flood zone that do not receive a variance to waive requirements related to flood protection.
- Area of wetland restoration projects.
- Change in FEMA Community Rating System evaluation.
- Percent of new properties developed outside of floodplains and high storm surge areas.

Action ES2.1.1. Evaluate the impact of potential sea level rise when reviewing development proposals and in the preparation of budgets, using *Vision 2100* as a guide.



Action ES2.1.2. Promote growth in the least hazard-prone areas, as determined by the FEMA Flood Insurance Rate Map (Map ES-1), the Storm Surge Map (Map ES-2), the Noise and Accident Potential Zones Map (Map LU-4), and other emerging datasets identifying potential sea level rise, land subsidence, and other hazards.

Action ES2.1.3. Revise development regulations to respond to the impact of potential sea level rise.

*Comments: Several research and technical assistance resources related to sea level rise are available, including those provided by*



*Old Dominion University and the Virginia Institute of Marine Science.*

Action ES2.1.4. Continue to monitor changes in tide data and its effect on flooding throughout the City.

Action ES2.1.5. Evaluate options to mitigate the impact of natural hazards, including flooding, using the *Hampton Roads Hazard Mitigation Plan* and *Vision 2100* as guides.

Action ES2.1.6. Develop a stormwater master plan that includes consideration of issues of water volumes and rates of discharge.

Action ES2.1.7. Continue to implement wetland design changes, such as the use of living shorelines that allow for the landward migration of wetlands, for resilience to sea level rise.



Action ES2.1.8. Improve the City's rating in the National Flood Insurance Program's Community Rating System (CRS) (see Ensuring Housing Choices for All chapter).



Action ES2.1.9. Create incentives to encourage developments to be built higher than the minimum Base Flood Elevation (BFE) in mapped flood hazard areas and above grade elsewhere in the City.

Action ES2.1.10. Ensure that all new development in designated flood-prone areas complies with the City's flood protection regulations (see Ensuring Housing Choices for All chapter).

Action ES2.1.11. Determine the appropriate strategies to mitigate the impact of flooding to existing flood-prone structures.

*Comments: Options include elevating, acquiring, relocating or otherwise retrofitting structures.*

Action ES2.1.12. Ensure that residents and property owners in flood prone areas are notified of the threat to their properties (see Ensuring Housing Choices for All chapter).

Action ES2.1.13. Identify areas of the City that are particularly susceptible to inundation and develop a communication strategy to notify residents in advance of and during flood events.

Action ES2.1.14. Continue to participate in the development and implementation of the *Hampton Roads Hazard Mitigation Plan* to address potential hazards on a regional basis.

Action ES2.1.15. Pursue amendments to the Zoning Ordinance that enhance tree protection, conservation, planting, and replacement requirements in areas subject to recurrent flooding.

### **Environmental Sustainability Goal 3. Incorporate sustainability into daily living.**

#### **Outcome ES3.1. Reduced energy consumption due to the application of energy efficient design features and technologies.**

*Metrics:*

- *Percent change in energy use per square foot of city facilities.*
- *Percent change in the number of LEED or Energy Star buildings.*
- *Number of trees planted on public property.*
- *Number of large and mature trees planted by residents and businesses on private property.*

Action ES3.1.1. Develop criteria for constructing new city facilities to LEED or ICC International Green Construction Code standards.

*Comments: LEED supports the adoption of sustainable “Green” building and development practices through rating systems that recognize projects that implement strategies for better environmental and health performance. ICC International Green Construction Code is a model code focused on “Green” building design and performance.*

Action ES3.1.2. Develop criteria for applying LEED Existing Building standards to renovations and rehabilitations of City facilities.

*Comments: The LEED for Existing Buildings Rating System helps building owners and operators measure operations, improvements and maintenance on a consistent scale, with the goal of*

*maximizing operational efficiency while minimizing environmental impacts.*

Action ES3.1.3. Promote the use of alternative energy through supportive code changes to permit and require the use of new technologies, such as solar and wind power, while ensuring such technologies are compatible in established residential areas.

Action ES3.1.4. Identify city-owned properties where alternative energy sources could be utilized.

Action ES3.1.5. Promote “Green” municipal projects as models for the private sector.

Action ES3.1.6. Promote the use of “Green” building technologies, including weatherization, to provide energy conservation benefits through programs such as the Norfolk Green Home Choice Program (see the Ensuring Housing Choices for All chapter).

*Comments: The Green Home Choice Program is a voluntary certification program that educates occupants about a home’s environmental attributes, with the goal of sustainable home design.*

Action ES3.1.7. Continue to offer incentives to encourage energy efficient design and building, while evaluating the feasibility of additional incentives for both new construction and renovation projects.

*Comments: Norfolk currently offers expedited permitting for construction under the Green Home Choice Program. Other jurisdictions have adopted other incentives such as energy efficient real estate tax credits.*

Action ES3.1.8. Continue to monitor changes in technology and legislation to identify opportunities for implementing new “Green” building programs and enhancing existing ones.

Action ES3.1.9. Encourage the use of design features such as shade, skylights, operable windows, or vegetation placed appropriately to promote resilience and potentially allow occupancy during times of recovery.



**Outcome ES3.2. Residents and businesses who take responsibility for reducing their impact on the environment and take steps towards improving it.**

Metrics:

- Percent change in total solid waste generated, composted, and recycled.
- Change in land area dedicated to community gardens.
- Number of incentive programs for tree protection, conservation, planting, and replacement by residents and businesses on private property.

Action ES3.2.1. Continue to offer, or sponsor in cooperation with local institutions, environmental education and volunteer stewardship opportunities.

*Comments: Examples of environmental stewardship efforts include the Elizabeth River Project's Star Homes program, the Chesapeake Bay Foundation's oyster gardening program and the Lafayette River Partnership's wetland restoration activities.*

Action ES3.2.2. Encourage the use of "environmentally-friendly" building practices, such as green roofs, cool/white roofs and pervious pavers, in private development.

Action ES3.2.3. Adopt energy-efficient outdoor light standards to reduce over-lighting of development sites, including requirements to turn off outdoor lighting, other than security lighting, after hours of operation.

Action ES3.2.4. Continue to support and promote household waste recycling opportunities in both single family and multifamily housing and evaluate potential changes to yard waste disposal practices.



Action ES3.2.5. Encourage citizens, neighborhoods, and businesses to take a larger role in cleaning and maintaining public spaces.

Action ES3.2.6. Promote the reuse of water through strategies such as rain barrels, rain gardens, and grey water recycling.

*Comments: Grey water recycling is the reuse of water collected from sinks, showers, bathtubs, washing machines and dishwashers for irrigation, toilet flushing and other reuse options.*

Action ES3.2.7. Support the development of community gardens on vacant or underutilized parcels as a way to encourage urban agriculture.

Action ES3.2.8. Encourage the provision of independent back-up sources of power to be used when primary power source is interrupted for an extended period.

Action ES3.2.9. Implement the Green Infrastructure Plan by creating a tree planting credit program (a “treebate”) through public-private partnerships or city programs to reward those who plant trees on private property.

Action ES3.2.10. Implement the Green Infrastructure Plan by expanding existing recognition programs for community tree planting projects to include categories for businesses, churches, schools, and others.

Action ES3.2.11. Pursue amendments to the Zoning Ordinance that incentivize tree protection, conservation, planting, and replacement.

Action ES3.2.12. Implement the Green Infrastructure Plan by establishing volunteer groups to help carry out planting projects, outreach and tree care workshops to increase city capacity for expanding and managing the urban forest.

Action ES3.2.13. Implement the Green Infrastructure Plan by improving the city’s data on trees to ensure good management and longevity.

*Comments: Methods to achieve this action may include:*

- Create a tree map for crowdsourcing and tracking trees planted in yards and other private properties.*
- Update the tree canopy map every five years to determine and allow for comparison of tree canopy coverage change over time.*
- Implement a citizen tree survey and train community members in tree survey to track tree diversity, coverage and health.*
- Institute street and park tree risk assessments in areas most at risk from storm damage and track responses.*

